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(54) A process to manufacture "in situ" safety barriers for roads.

(57) A process of manufacturing "in situ" of safety barriers for roads and highways, forming these barriers separating members for opposite traffic ways. The process is based in filling a mould with a suitable material whose density is similar to that for concrete, so to get blocks that, near-by disposed, form the barrier on the road. The moulds are placed in the final location to be filled later directly from a concrete-mixer truck and to have so the barrier without handling the blocks.

The mould can be made of any suitable material (polyester, steel sheet, rigid plastics,....) and will have a higher filler mouth and holes for air exit, as well as lower projections that form legs, so that the barrier that has to be made, remains sligtly separated from the ground and allows the flow of the water under the mould.

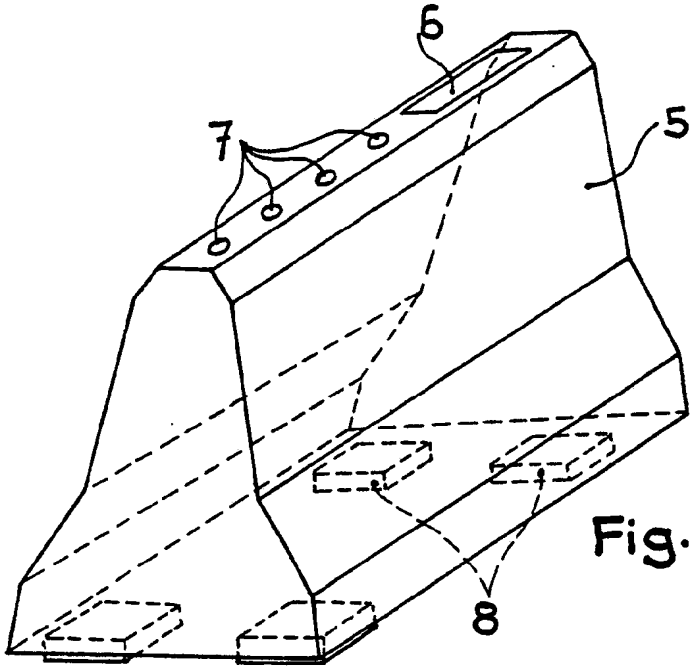

Fig. 3

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A process to manufacture "in situ" safety barriers for roads.

The invention refers to a process to manufacture "in situ" safety barriers for roads and highways, being applicable also to the manufacturing of special kerbs.

In making the present roads and as a member of separation and safety between opposite traffic ways, it is necessary the invention or installation of a protecting member intended to fulfill two main objects:

a) To avoid that a vehicle that has suffered an accident in one way inuades the opposite way.

b) To allow the passage of water in case of rain or flood, being the this passage under said protecting member, so that there is no stagnation of the water flooding a given way, interrupting the traffic or at least causing an accident.

One of the ways of manufacturing of said safety barriers consists in some sheet strips (1) coupling rigidly to small metal pillars (2) nailed to the ground (see Fig. 1). This safety barrier performs the required functions of limiting, absorbing the Kinetic energy of the mass of the vehicle and it allows to pass the water, although an important problem arises, like the permanent deformation in case of shocks, causing high maintenance costs.

Another way of manufacturing of such safety barriers is based on concrete blocks (3) in mass prefabricated (see Fig. 2), in a shape more or less arched and joined together semirigidly and with a mass enough to bear the shock of a vehicle. These blocks have on their underside projections or legs (4) to allow the passage of water.

The usual minimum dimensions of these blocks are 70 cm wide, 80 cm high, 100 cm long, a volume of aprox. 500 cm^3. Taking into account the concrete density (0 = 2, 35) the mass of each member or block will be 1, 175 Kg aprox. With regard to the previous system, it has the advantage that its maintenance is practically null.

In both cases, the safety barrier is manufactured when the road is quite finished, including in said finishing the rolling layer, road borders, etc.

As the process referred in the invention is intended to replace the barriers made from prefabricated concrete members mentioned below, the features of this manufacturing way are going to be analysed; that is, the features of the barriers made of prefabricated concrete blocks, which have the following characteristics:

Material :

The concrete must be white, by using white cement or cements from some quarries of special materials that give a light-coloured texture. The typical strength is between 150 and 175 Kg/cm^2.

Manufacturing :

It is performed in factories duly provided with moulds enough. The process is as follows : filling of the concrete moulds, vibrating, setting and subsequent unmoulding.

Because of the weight of each block, loading and unloading for storage is through a crane.

- Storage -

The area of each block is 700 cm^2 (100 x 70cm), being the height with legs aprox. 77 to 85 cm.

From the foregoing, it is easy to note the great difficulty to store the blocks, because they cannot be stacked and must remain near -by. Let us consider the required area for storage. Let us suppose a road of 10 Km that requres the manufacturing of 10. 000 blocks, so that the minimum storage area must be 7.000 m^2, that is, an area bigger than a football field.

Handling :

It always require a crane or the assistance of one or more workers.

Transport :

By using a truck of 2, 50 m x 10 m, the amount of 1 mm long blocks that the truck can carry will be 35 units maximum, being this limitation caused by their area and mass.

- Handling at work : -

The minimum number of operations at work is two, stacking on road edge and mounting in the final location in the middle of the road.

Terms :

At present, publick works depend on the economic factor, and besides on the termination term, so that the time required to finish a road through concrete barriers must be necessarily long, because there are four main disadvantages:

1) Slow manufacturing.
2) Big stacking areas.
3) High costs, because the expenses for the concrete is made since the early step of manufacturing, resulting high storage costs or delay in supplies because of slow making.
4) Great difficulty in handling, being required cranes and personnel, resulting in a slow handling.

Taking into account the aforesaid features and disadvantages showing the system of manufacturing protection or safety barriers in roads, the process of the present invention has been designed so to have a barrier manufacturing system much more rational and more advantageous than those known and above-mentioned.

More precisely, the process of the invention is based in achieving a mould which, after being placed in the definitive location on the road, will be filled with a mass of suitable material, being this material any product that has a density similar to concrete.

As for manufacturing, this will be based on performing the mould through a base mould that constitutes the negative member, which later, it will be filled with the aforesaid material.

The said negative mould can be made of polyester, sheet, rigid plastics, etc., or of any other light, resistant material. In any case, the weight of the mould per meter must not be higher than 30 Kg; while the shape of the mould will be the suitable one for each application; that is for each requirement.

As for the dimensions of said mould, they will be the suitable ones for each requirement. In any case, as compared with the blocks used in above-mentioned conventional systems, it is seen that for the same dimensions, the storage of the moulds, forming part of the invention, will require an area lower than required to store the known blocks, because the former can be stacked.

Likewise, handling will be easier, because of lightness of moulds, which can be carried to work after terminating the road, to store them in a suitable place, requiring no more than a worker to fill them with the material, from a concrete mixer, through a gravity device.

The transport of the moulds is made easier, because owing to their less weight, it can be carried more units than in the case of concrete blocks.

The advantages that affords the method of the invention can be summarized as follows:

- Manufacturing speed.
- Making in ann colour.
- Handling easiness.
- Marking speed.
- Replacement easiness.
- Minimum and economic maintenance.
- Posibility to incorporate soft strip to limit the mould. - Possibility to use the mould or moulds as a marking means, combining units with different colours, for instance, red and white.
- Economy and terms.
- Higher finishing quality
- Possibility to use any semi-rigid fixing system between moulds.
- Possibility to make the moulds in any geometric shape, adapting so to the requirements of each application.

Front the comparative picture illustrated below, can be seen the aforesaid advantages and others that

ilustrates the new system or method to make safety barriers with regard to the conventional or present system in which the barries are made of prefabricated concrete blocks.

COMPARISON OF SYSTEMS		
Concept	Presente system : prefabricated concrete	New system
Weight in shop	1.100 Kg/m	30 Kg/m
Weight, finished on the road	1.100 Kg/m	1.130 Kg/m
Finishing, texture	coarse	smooth
Stability to agents atmospheric	good	good
Base material	concrete only	any, with density 2,1
Possibility of smooth and bright colours	No	Yes
Possibility of writing, marking, stripping,..	No	Yes
Handling at work	Bad	Excellent
Supply	Slow	Quick
Execution at work	Slow	Quick
Transport	Difficult-expensive	Easy-cheap
Manufacturing	Slow	Quick
Stacking-storage	Bad	Excellent
New designs	Difficult	Easy
Maintenance	Good	Excellent
Spare parts	Good	Excellent
Can save markings?	No	Yes

From the drawings appended to the present specification, which form part of the same, the scope of the invention can be easily understood, as well as the barriers made according to the recommended method, being all this illustrated for an orientative and non-limiting end

The drawings show:

Fig. 1 ilustrates an schematic view of a protection or safety barrier relative to the state of the art defined at the beginning of this specification. As it was discussed, the barrier is made from sheet strips (1) attached to small pillars (2) nailed to the ground.

Fig. 2 shows another schematic view of a second safety barrier relative to the state of the art previously defined. This barrier is made of concrete blocks (3), mass fabricated, joined together, semi-rigidly, and provided with under projections or legs (4).

Fig. 3 shows a perspective view of a mould made of sheet, plastics or any suitable material, in one of the manufacturing shapes which is intendend to be filled with material to form the barriers made according to the present invention.

Fig. 4 shows another perspective view of a new model of block already manufactured, corresponding also to the object of the invention. In this model can be seen side coupling means.

Fig. 5 shows another embodiment similar to the preceding one, but with a different side coupling system.

Fig.6 shows another embodiment similar to the preceding ones, with a different coupling system, consisting, in this case, in two metal bars embedded inside the vertical-shaped block, which project from its ends so that fixing is performed through these, by nuts and pletine, or by springs.

Referring to the above-mentioned Figs 3,4,5,6 and 7, the recommended method is base on a mould (5) that can have any geometric configuration, being provided, on the top, with a filling hole (6) and air exit holes (7), while on the bottom has the projections (8) acting as support legs.

The mould so made can be manufactured in factory and carried later to work, locating it in the definitive place of the road, so to be filled then with a material whose density is similar to for the concrete. The filling can be performed direct form the concrete-mixer through a gravity density coupled to the former and, at the opposite end, in front of the filling mouth (6) of the mould (5), allowing that a sort of funnel can be placed on the filling mouth.

So the road barriers can be made quickly, requiring, on the other hand, a reduced stacking surface and having the advantage of storing all the required moulds for a road without big costs, because the mould is cheap and the concrete will not be used till the last moment.

It must be noted too that through this system a lot of filling can be performed "in situ", since the filling is made at work, what is not the case for the system of prefabricated blocks, because to be able to fill the mould in shop, it is necessary to wait that the concrete sets and to unmould before making another filling.

As illustrated in Figs 4 and 5, the block made according to the method of the invention, referred as and 9a in those Figures, has side coupling means to have the barrier finished on the road; being this coupling means formed by a side projection (10-10a) mating in a recess (11-11a) provided in the opposite side, so to have the blocks matched, which include besides their relative lower projections or legs (12-12a).

In Fig. 6 is illustrated another block similar to 9b, in which the means to engage an adjacent block is a pair of rods (13) encased in the concrete. The rods (13) are metallic and rigid, and are housed in tubes of suitable diameter, which are integral with the block. The rods (13) project a short distance through the top and the bottom, being provided in the top some grooves (14) to arrange relative strips and nuts that will screw in the projecting and threaded ends of the rods (13), forming so the fixing between the blocks or moulds 9b.

Besides, it has been foreseen that the projections of the rods ab can have a transverse hole, to attach the ends of the spring that, in this case, will constitute the fixing.

The block 9b has also the relative lower projections or legs 12b.

Claims

1.- A process of manufacturing "in situ" of safety barriers for roads, substantially characterized for consisting in forming a mould, which is disposed in the definitive location in the road, filling then the mould with a suitable material having a density similar to that of concrete; having foreseen that this step of filling is carried out directly from a concrete-mixer truck, throuhg a gravity device that is coupled to a funnel arranged on the top of the mould; all this to form the barrier of the invention after previous and adjacent arrangement of all the moulds required to make the said barrier.

2. - A process of manufacturing "in situ" of safety barriers for roads, according to the claim 1, characterized for the mould has a conventional configuration, as required, and are made from a light material as polyester, steel sheet, rigid plastics, ... having on the top a filler opening, and holes for air exit, while the mould has side coupling means to engage both adjacent moulds, being such coupling means formed by a projection in one side, that engages an opening provided in the opposite side, with two rods embedded in the mould, projecting the rods on the top and bottom to be attached each other through a strip fixed by clamping nut on the threaded end of the rods, or spring with ends encased in relative holes of said rods.

3.- A process of manufacturing "in situ" of safety barriers for roads, according to the claim 2, characterized for the mould has on the bottom some projections acting as legs, allowing the flowing of the water under the mould.

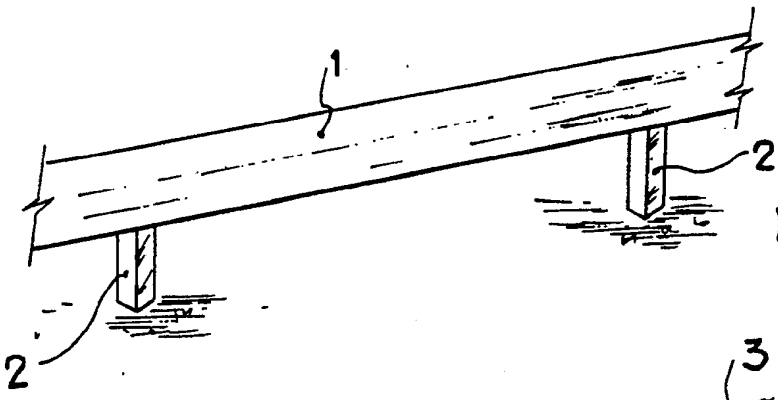

Fig.1

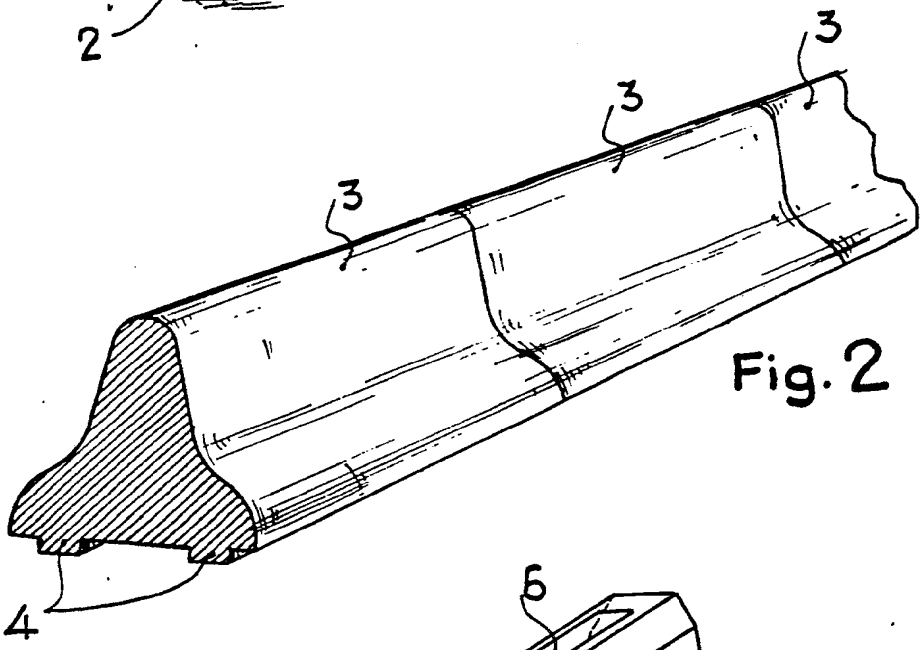

Fig.2

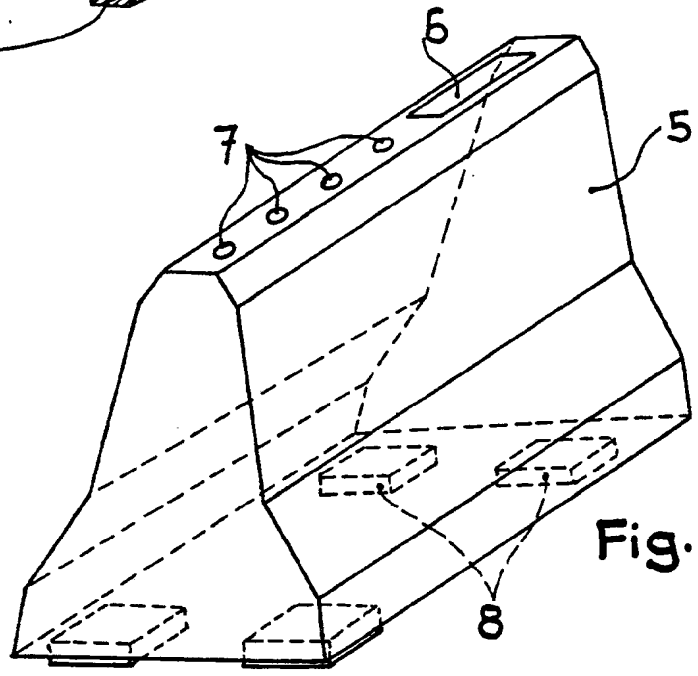

Fig.3

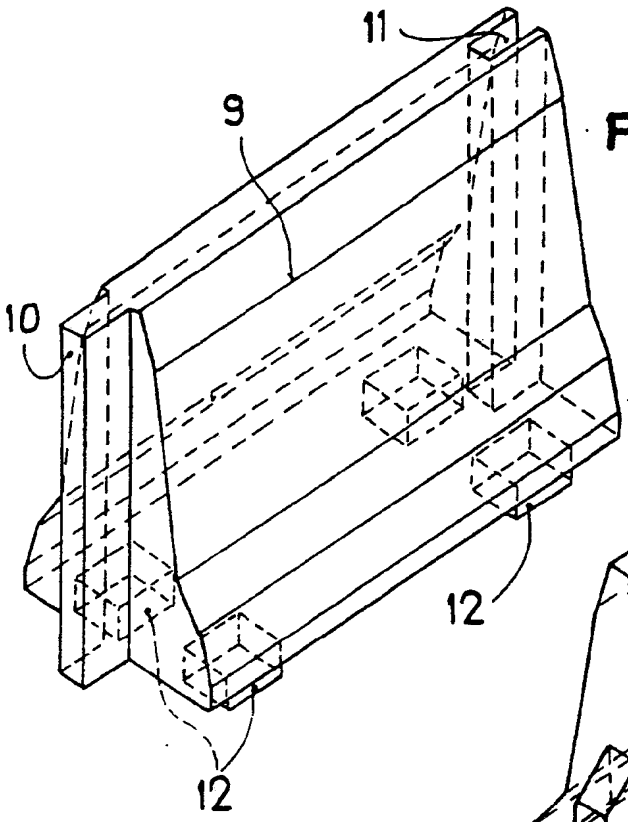

Fig. 4

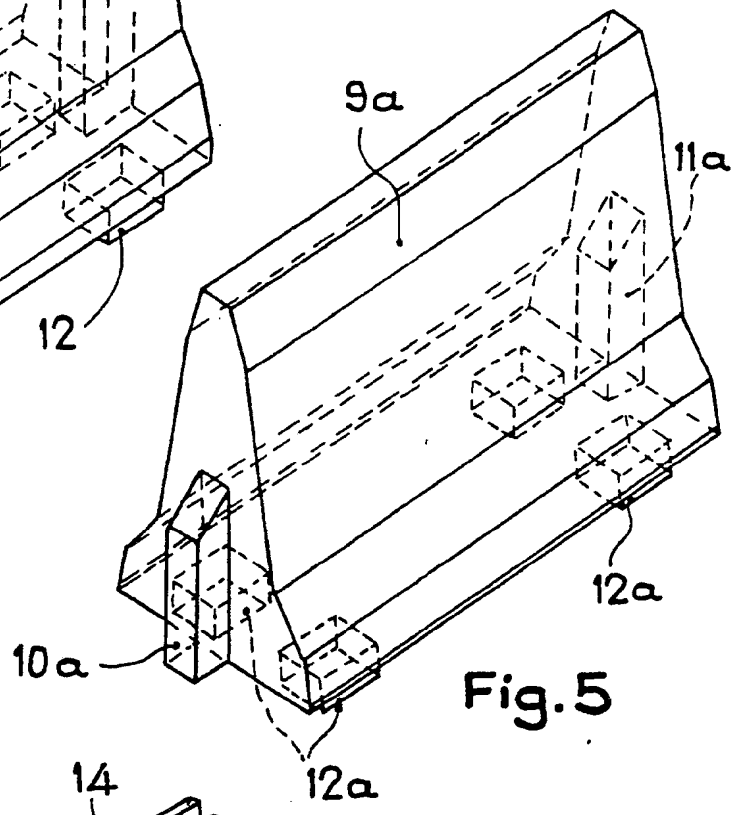

Fig. 5

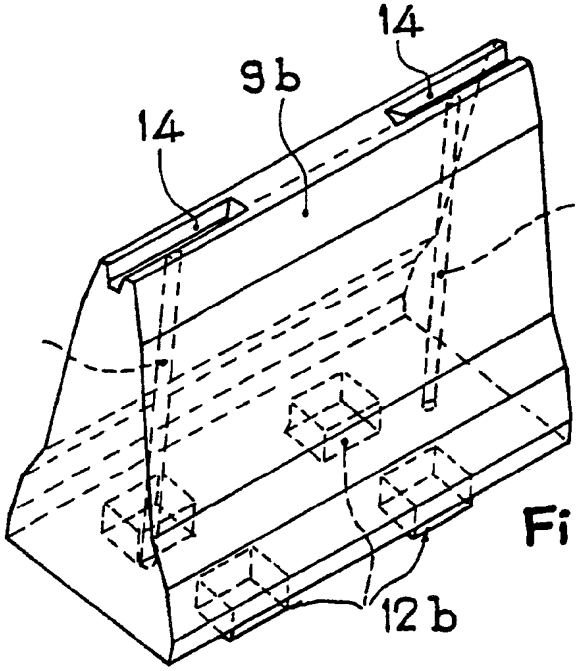

Fig. 6

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EUROPEAN SEARCH REPORT

Application Number

EP 88 50 0124

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	CIVIL ENGINEERING-ASCE, vol. 41, no. 10, October 1971, pages 77-80; E.C. LOKKEN: "Concrete median barrier safely redirects impacting cars" * Page 78, middle column, lines 36-43; figure 1; photo; page 79, middle column, lines 15-17; page 79, right-hand column, lines 3-6,15-19 *	1	TECHNICAL FIELDS SEARCHED (Int. Cl.3)
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	16-05-1989	SCHUMAN R.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
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EP 88 50 0124

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.3)
A	EP-A-0 125 817 (QUICK-STEEL ENGINEERING) * Page 1, lines 1,2; page 3, lines 19-26; page 5, lines 29-32; page 6, lines 13,14; page 9, lines 4-11,15-17; page 10, lines 1,2,12-17; page 11, line 25 - page 12, line 8; figures 7,8,10,11 *	2	
A	FR-A-1 430 536 (BONA) * Page 1, left-hand column, lines 5-8,31-34; page 1, right-hand column, lines 1-5,10-15; page 2, left-hand column, lines 1-6,50-56; figures 1,2,4,6 *	2	

TECHNICAL FIELDS SEARCHED (Int. Cl.3)

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